

XXXVIII.—*Observations on Freshwater Sponges.*

By Dr. A. WIERZEJSKI*.

THE notes on freshwater sponges, lately published in the 'Zoologischer Anzeiger' (nos. 238 and 239) by F. C. Noll and Dr. Vejdovsky, lead me to make the following observations:—

As regards the new species, *Spongilla glomerata*, Noll, described in no. 238, I adopt Dr. Vejdovsky's opinion, who considers it identical with *S. fragilis*, Leidy †.

M. Noll further states that he has found *Spongilla fluviatilis*, L. & K., with both smooth and tuberculate spicules, and even with the latter predominating, from which he thinks it may be concluded that *S. Mülleri*, L. & K., might only be a variety of *S. fluviatilis*, L. & K. Although among a great number of examples of *S. fluviatilis*, L. & K., which I have examined, I have never found a single one with tuberculate spicules, I will not cast any doubt upon the correctness of Noll's statement. Nevertheless I regard his supposition as inadmissible, as the above-mentioned species are very well distinguished from each other by well-marked characters which remain constant in whole series of forms. For reasons to be stated below I even esteem *S. Mülleri* to be generically distinct from *S. fluviatilis*.

It may also be mentioned in passing that Dr. Marshall three years ago expressed the opinion that forms with coating-spicules in the external envelope of the gemmules might pass over into forms with amphidisci in that layer. This supposition is supported chiefly upon the structure of the gemmules of *S. jordanensis*, var. *druliaformis*, Vejd. As early as the year 1884 I expressed doubts as to its correctness ‡. Now, in his most recent revision of the European Spongillidæ Dr. Vejdovsky has given up both his new species *S. jordanensis* and the new variety *druliaformis*—a hint that it is not advisable to found far-reaching hypotheses upon isolated discoveries.

Finally, I would call M. Noll's attention to the fact that he has formed an erroneous conception of the development of the gemmule-mass of *S. fragilis*. The individual gemmules of the mass are developed, not, as he states, by division from unusually large deposits within the cellular cortical layer, but from special deposits, as I proved in the year 1884, and

* 'Zoologischer Anzeiger,' no. 245, February 28, 1887, pp. 122-126.

† See 'Annals,' February 1887, p. 168.

‡ See 'Orozwoju paków gabeł słodkowodnych europejskich tuczyci o gad. *Sp. fragilis*, Leidy' (Krakow, 1884), p. 5.

as indeed is easily seen from the structure of the completely formed mass.

Passing to Dr. Vejdovsky's statements, I will, in the first place, venture to make some remarks upon his revision of the known European Spongillidæ*.

This naturalist accepts only eight species as so-called good species, and these he distributes in four genera. In my judgment the specific rank of *Euspongilla rhenana*, Retzer, must also be regarded as doubtful. It is indeed sufficiently characterized by the perfectly smooth coating-spicules bent at the ends; but I suspect that these structures are abnormal; for among the tuberculate coating-spicules of *Euspongilla lacustris*, I have often found perfectly smooth crooked ones of different lengths.

Moreover, I possess two forms with such unusually developed siliceous elements in the shell of the gemmule that upon this ground alone they might be designated as new species, if certain considerations did not witness in favour of abnormal development.

In my catalogue of the Galician species † I have cited the species *Ephydatia Mülleri*, L. & K., under the name of *Meyenia Mülleri*, chiefly on account of its histological structure, in which it differs from all the species known to me, and therefore merits being placed in a separate genus. Thus the soft body of this sponge consists of the histological elements and organs which have been well known since Lieberkühn's time, and of vesicular cells. The latter agree morphologically with the structures which have long been known in marine sponges, which O. Schmidt has described in two species of *Esperia*, and most appropriately compared with masses of soap-bubbles. Portions of tissue in which these are particularly accumulated remind us, as Vosmaer ‡ correctly remarks, of the vesicular connective substance of Leydig, and of the tissue of the mantle of the Tunicata. In *Meyenia Mülleri* they lie closely approximated, especially in the dermal layer, and arranged in several layers, more particularly in the neighbourhood of the oscula; but they are also to be met with throughout the mesoderm, where they occur in greater or less number in different periods of the life of the stock. In the fresh state they are limpid spheres, in which we always detect a round vesicle, the nucleus, and further minute, very brilliant granules in variable number, and different sized portions of a

* See 'Annals,' *loc. cit.*

† See "Ogabkach slodkowodnych galicyjskich." Krakow, 1885. (Spraw. Kom. Fizyogr. Akad. Umierter, tom. xix.).

‡ Bronn, 'Klassen und Ordnungen,' Porifera.

contractile substance. They originate from nucleated parenchyma-cells by the development of a gigantic vacuole, the walls of which are chemically differentiated.

Their behaviour with different reagents is worthy of notice. A moderately strong solution of acetic acid, after acting for a short time, causes them to burst, when the contents imperceptibly disappear, and only the nuclear vesicle with traces of the excessively fine membrane remains. An interrupted galvanic current produces the same phenomenon. Ammonia added by drops under the covering-glass effects a remarkable alteration. A double vesicle is produced; the inner one occupies an excentric position, its walls show a folding, its contents remain hyaline. The same alteration of the vesicular cells is observed during the gradual decay of the sponge. Solutions of hyperosmic acid (1 per cent.) and nitrate of silver produce no perceptible change; but if the preparations are exposed to the light the vesicular cells treated with the former solution acquire a light brownish colour, those with the second remain limpid, and only the granules and swellings of the contractile substance adhering to the surface are blackened. By treatment with strong alcohol and 1 per cent. solution of chromic acid the alteration is most striking. As a rule double vesicles are produced; the inner presents very multifarious images; its contents appear sometimes finely granular, sometimes reticular, sometimes nodular, &c. Fine filaments are often seen stretched from the surface of the inner vesicle to the inner surface of the outer one. As a matter of course the great variation of the images corresponds to the different degrees of concentration of the solutions employed, also chiefly to the different stages of development of the vesicular cells and their varying chemical constitution.

The vesicular cells treated with alcohol and chromic acid very readily imbibe picocarmine, and thus strike one at once in preparations. On the contrary, they prove very resistant to aqueous solutions of aniline colours.

Their behaviour towards Lugol's solution is also very characteristic. Thus, if examples taken from dried specimens are placed in water for a few minutes and then treated with this solution, the shrivelled vesicular cells immediately acquire a light chestnut-brown colour, while the other elements become yellowish. After the partial volatilization of the iodine the colour changes to violet or wine-red. If a stronger solution be employed a dark brown colour is obtained. Precisely similar results are obtained by treating alcoholic preparations with Lugol's solution, only the action is not so rapid, and the specimens must be allowed to lie longer in the water.

The nuclear vesicle lying at the surface does not acquire the characteristic iodine-coloration. Judging from this reaction with iodide of potassium we might suppose the presence of glycogen in the vesicular cells. But as when the preparations treated with Lugol's solution are heated the colour does not disappear, and the material in question appears to be insoluble in water, we must reserve the final decision until it has been converted into sugar. A test for amyloid gave negative results, as also for sugar.

Although the nature of the substance contained in the vesicular cells remains for the present unknown, their behaviour with iodide of potassium furnishes us with a means of at once recognizing *Meyenia Mülleri*, even in small fragments, by the characteristic coloration of the vesicular cells. The circumstance that the vesicular cells occur at all periods of the life of the sponge, and even take part in the development of the gemmules, and, further, that in the regeneration of the stock from the gemmules they appear immediately after the emergence of the contents, indicates distinctly that they have a not unimportant part to play. It may be that they store up reserve material, or that they furnish nutriment to the cells surrounding them, or produce a secretion of some kind; at any rate, however, they indicate a peculiar œconomy in *Meyenia Mülleri*, distinguishing it from all other species.

After this brief description of the histological peculiarities of this species I need hardly add that it ought to have a special position in the system of the freshwater sponges. Further, I would point out that by the generally triple arrangement of the amphidisci in the shell of the gemmules, by the extremely rare development of the sexual products, and finally by the usually tuberculate skeleton-spicules, it seems to be sufficiently separated from the other *Meyeniæ*.

I have still to make a brief remark upon the following statement of Dr. Vejdovsky. This naturalist states (*Zool. Anz.* no. 239) that he induced M. Petr to investigate the minute structure of the external envelope of the gemmules of various *Spongillidæ*, and that the latter had succeeded in demonstrating "that this envelope in most species shows *the same structure* that occurs much more distinctly in *S. fragilis*, *S. nitens*, and *Trochospongilla erinaceus*."

This result of M. Petr's I must characterize as perfectly correct, especially as, in my memoir published in 1884 (*loc. cit.* p. 27), the following passage occurs in the concluding remarks:—"The remarkable coating of the gemmules of *Sp. fragilis* (*Lordii*) and *Trochospongilla erinaceus* represents genetically the insignificant reticulation between the amphi-

disci of the species of *Meyenia* (*Ephydatia*), and in the same way that between the coating-spicules of the species of *Spongilla*. In both cases this tissue, consisting of air-chambers, acts as a hydrostatic apparatus, which has attained its most powerful development in the two European species—*Sp. fragilis* and *Trochospongilla erinaceus*.”

XXXIX.—*The Polyzoa of the Adriatic: a Supplement to Prof. Heller's 'Die Bryozoen des adriatischen Meeres,' 1867.*
By the Rev. THOMAS HINCKS, B.A., F.R.S.

[Concluded from vol. xvii. p. 271.]

[Plate IX.]

SCHIZOPORELLA, Hincks (*continued*).

Schizoporella vulgaris, Moll.

? *Lepralia Botterii*, Heller, Bryoz. d. adriat. Meeres, p. 30, pl. ii. fig. 4.

? *Lepralia Stossici*, *ibid.* p. 31, pl. ii. fig. 7.

I do not venture to refer Heller's two species noted above with certainty to the well-known *S. vulgaris* of Moll in the face of the figures which he has given of them; but his descriptions apply for the most part to the latter form, and I think it more than probable that we have only to do with a single species. The neck-like prolongation of the upper part of the zoecium which is shown in the figure of *L. Botterii* is certainly not characteristic of *S. vulgaris*; but there is no reference to it in the diagnosis; the cells are described as "oval, moderately convex, smooth." The present species seems to be common in the Adriatic and could hardly have escaped notice.

Primary cell ovate, smooth, with an oval aperture occupying the upper part of the front, set round with spines, of which the one in the centre of the lower margin is taller than the rest, slender, and bent inward over the opening.

Range. Britain (chiefly south and west); Ireland (west coast); Naples; Madeira.

Schizoporella Cecili, Audouin.

? *Lepralia Perugiana*, Heller, *op. cit.* p. 26, pl. ii. fig. 10.

I should unhesitatingly identify Heller's *L. Perugiana* with